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Repository Citation

Smith, V. L., Peterson, L., Starr, J. E., & Satiani, B. (2012). External Iliac Artery Stenting: High Incidence of Concomitant Revascularization Procedures. *Vascular and Endovascular Surgery*, 46 (3), 246-250.
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External Iliac Artery Stenting: High Incidence of Concomitant Revascularization Procedures

Vascular and Endovascular Surgery
46(3) 246-250
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DOI: 10.1177/1538574412442400
http://ves.sagepub.com


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Abstract

Objectives: To review immediate results, patency rates, hemodynamic success, and incidence of concomitant procedures with external iliac artery stenting (EIAS). **Methods:** Demographic features, category and clinical grade, Trans-Atlantic Inter-Society Consensus II classification lesion type, pre- and postprocedure ankle-brachial indices, and primary patency were compared between group 1 (EIAS without distal revascularization) and group 2 (EIAS with concomitant distal revascularization). **Results:** No mortality and a 100% immediate technical success rate was recorded in group 1 ($n = 12$) and group 2 ($n = 24$). Eleven patients (30.6%) also had stenting of the adjacent common iliac artery. Two thirds of group 2 patients required concomitant femoral or distal revascularization. **Conclusions:** No difference in stent patency rates was found between patients in group 1 versus group 2. Patients requiring EIAS tend to have more diffuse arterial disease necessitating complicated open reconstruction and/or distal revascularization, as well as more proximal iliac stenting.

Keywords

stenting, iliac stenting, concomitant procedures

Introduction

For patients with aortoiliac occlusive disease, surgical revascularization has traditionally been the primary method for treating disabling claudication or critical limb ischemia. The success of endovascular therapies directed toward the Trans-Atlantic Inter-Society Consensus (TASC) A and B lesions has now been recognized and in most cases regarded as preferable to open surgical techniques.¹ While the initial TASC guidelines recommended an open surgical approach for the more complex TASC C and D lesions, this has also been challenged in recent reports, which propose an expanded role for endovascular therapies in these lesions.²⁻⁵ However, not enough emphasis has been placed on the fact that patients requiring external iliac artery stenting (EIAS) have been noted to also need concomitant procedures either with common iliac artery stent (CIAS) or with distal revascularization procedures.

The purpose of this study was to review immediate results, patency rates, hemodynamic success, and incidence of concomitant procedures with EIAS at our institution.

Methods

A retrospective chart/electronic medical record review in the Division of Vascular Diseases and Surgery at The Ohio State University Medical Center was performed from June 2004 to

December 2007. Thirty-six patients undergoing EIAS, with and without concomitant distal revascularization, were included. Demographic features, prevalence of risk factors, category and clinical grade of vascular lesions (Rutherford classification), TASC lesion type, and pre- and postprocedure ankle-brachial indices (ABIs) were recorded. Initial hemodynamic success (defined as an increase of the ABI from preprocedure >0.15) was measured for all patients. The patients were divided into 2 groups based on the procedure that was performed: group 1 (external iliac artery [EIA] stent without any additional procedures other than CIAS [$n = 12$]), and group 2 (EIA stent with a concomitant distal intervention/bypass or a local reconstruction in the groin [$n = 24$]). The 36 patients were further subdivided into 4 subgroups based upon the exact procedure performed (1a) EIA stent only ($n = 6$); (1b) EIA and common iliac artery (CIA) stent only ($n = 6$); (2a) EIA/CIA stent and distal revascularization, including open or endovascular procedures

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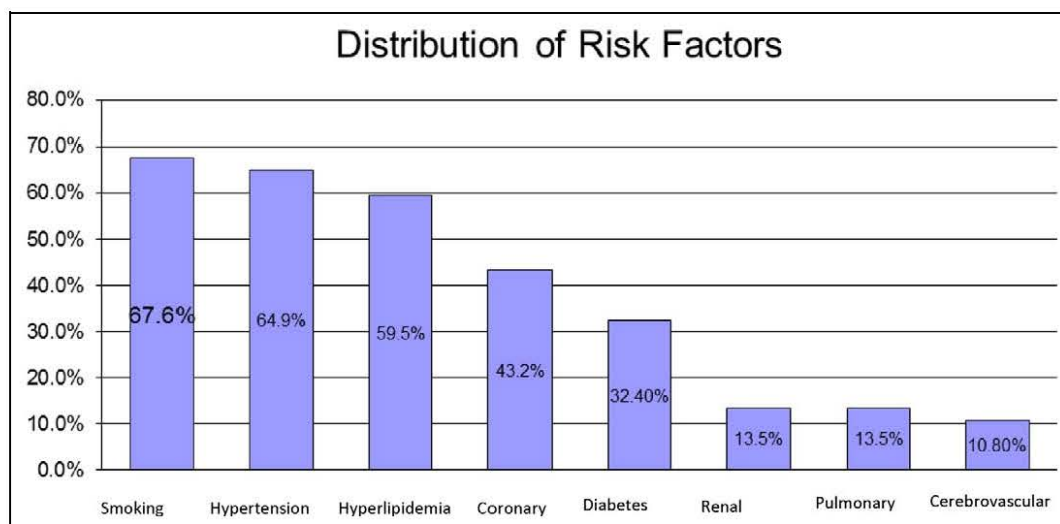


Figure 1. Distribution of risk factor.

($n = 20$); (2b) EIA/CIA stent and limited procedures consisting of mostly femoral endarterectomy with or without patches ($n = 6$). Two patients had both distal revascularization and femoral reconstruction.

Analysis of variance was used to determine whether the differences existed in the technical success and primary patency rates between the groups. This study was approved by the Institutional Review Board at the Ohio State University Medical Center.

Results

The study population consisted of 6 women and 30 men. The prevalence of risk factors were smoking (67.6%), hyperlipidemia (59.5%), coronary artery disease (43%), diabetes (10.8%), and hypertension (69.4%; Figure 1). The mean follow-up for the entire cohort was 20.9 months (standard deviation ± 19.3).

Of the 36 patients, 11 patients (30.6%) also had stenting of the ipsilateral CIA. No mortality was seen and a 100% technical success rate was recorded in both groups. Patients in group 2 underwent concomitant 13 femoral–popliteal bypasses and 5 femoral–femoral bypass procedures. Six (16.6%) patients had associated open femoral procedures consisting of endarterectomy with or without a patch or a local interposition graft (including 2 who had both).

The Rutherford classification of disease showed a predominance of category 3, class I lesions ($n = 21$). Anatomically, the majority of the lesions were TASC B ($n = 24$; Figure 2). Primary patency, as assessed by life-table analysis, was 100% for the first 10 months after intervention (Figure 3).

Primary patency was also determined in each of the subgroups. Primary patency was similar for groups 1a, 1b, and 2b. Group 2a (EI stent and concomitant distal revascularization) had primary patency rate similar to the other groups for the first 10 months, then declined to 70% thereafter (Figure 4).

The average preprocedure ABI was 0.63 ± 0.25 and the postprocedure ABI was 0.83 ± 0.25 . Although the initial

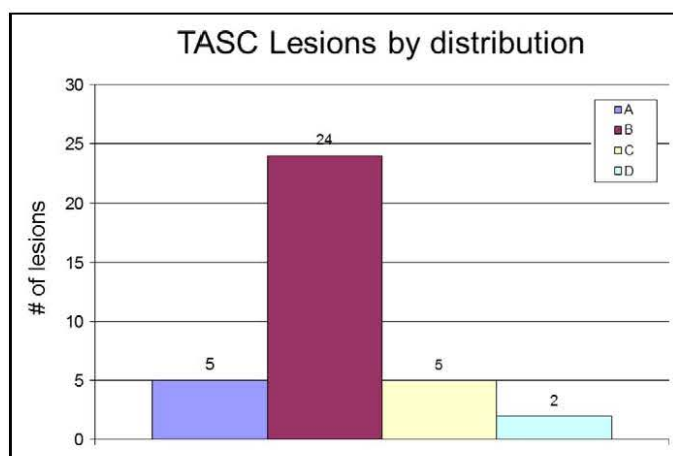


Figure 2. Trans-Atlantic Inter-Society Consensus lesions by distribution.

hemodynamic success was no different in groups 1 and 2, there was a trend toward a greater improvement in postprocedural ABI in group 2. Patients with TASC C lesions in group 2 exhibited a significantly greater improvement in postprocedural ABI compared with TASC A and B lesions undergoing the same treatment ($P < .05$).

Discussion

Prior to technical advancements in endovascular technology, femoral disease extending proximally into the EIA was treated with retroperitoneal endarterectomy, unilateral iliofemoral bypass, or crossover femoral bypass. Patients with predominantly unilateral atherosclerotic disease involving the iliofemoral system are now uniquely suited to a combined approach of iliac artery angioplasty/stenting with or without open reconstruction of the femoral/profunda artery, sometimes with distal revascularization as well. The argument against extending iliac stents across the inguinal ligament into the

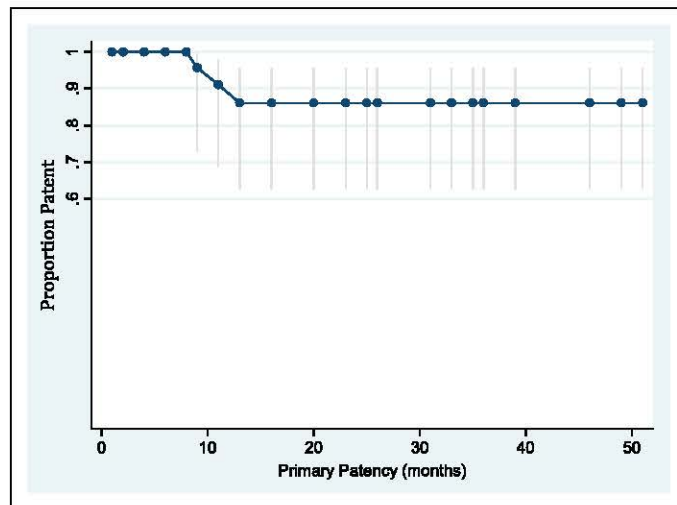


Figure 3. Primary patency rates for all patients undergoing external iliac artery stenting.

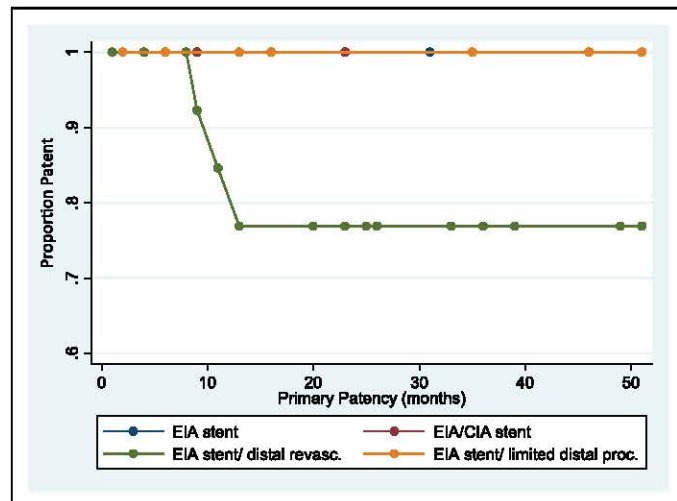


Figure 4. Primary patency of the subgroups.

femoral area is that of stent fracture when crossing the inguinal ligament as well as intimal hyperplasia due to external forces on the vessel.⁶ The question remains as to whether external iliac disease behaves more like CIA occlusive disease and is easily treatable with percutaneous techniques or to infrainguinal disease for which open surgical techniques may still be a better option.

The EIAS Results Compared With CIA Percutaneous Transluminal Angioplasty (PTA)/Stenting

Because of the widely held belief that EIA PTA/stenting has a lower long-term patency compared with CIA PTA/stenting, a review of EIA endovascular intervention is reasonable. The contiguous disease pattern is such that 7% to 66% of patients reported in the literature who underwent EIA stents also required CIA angioplasty/stent (Table 1). Thirty percentage

of our patients also required CIA stenting. In a study by Maurel and colleagues, 90 patients treated with EIA stents were followed up for a mean of 23 months.⁷ The primary patency rate was 97%, 89.7%, and 83.7% at 1, 2, and 3 years, respectively. Lee et al compared the results of EIA and CIA stenting in patients with occlusive lesions.⁸ In 49 patients with EIA lesions, the primary patency rate following treatment was 93% and 90% versus 88% and 78% for CIA lesions at 1 year and 3 years, respectively. Powell et al reported much less favorable results after PTA and selective stenting for EIA lesions with 47% and 18% primary patency rates at 12 and 36 months, respectively.⁹ There are likely selection biases in some studies reporting inferior patency rates with EIA interventions. These biases include differences in severity of clinical ischemia, stenting techniques, and types of stents. Although our series does not directly compare CIA with EIA stents, patency rates were not significantly different between patients with EIAS alone and those with CIA and EIA stents.

Influence of TASC Classification on Outcomes

The TASC classification provides a standardized method of anatomically describing arterial lesions as well as providing a common framework for reporting outcomes following treatment. For totally occluded or severe and complex lesions of the iliac arteries (TASC C or D), surgical intervention has been recommended or preferred, whereas endovascular intervention has been advocated for TASC A and B lesions.¹ The majority of patients (66%) in our report had TASC B lesions. Although patients with TASC C lesions had significantly greater rise in immediate postprocedural ABI (0.27) compared with the other 2 groups (0.23 for TASC A lesions and 0.26 for TASC B lesions; $P < .05$), there appeared to be no significant difference in patency rates. Maurel and colleagues reported that 77.7% of EIA lesions treated by endovascular means were classified as TASC A and B lesions.⁷ Like other authors they reported that TASC C or D lesions were associated with a much higher risk of restenosis.¹⁰ One of the reasons given for poorer outcomes in some series with EIA lesions compared with CIA lesions treated with stents is that patients with EIA lesions tend to have more severe multisegmental disease (TASC C lesions.) This is supported in our current series with one third requiring concomitant CIA stenting and two third requiring concomitant distal revascularization. Only 6 patients underwent EIA stenting alone.

Primary patency has been reported to be significantly lower in patients with TASC type C or D lesions.¹¹ In a large series of 533 CIA and EIA lesions followed for a mean of 72 months, 69% were classified as TASC A and B, whereas 31% were TASC C and D lesions.¹² The procedure time and complication rate were both higher in the more severe TASC C and D groups. However, no significant differences existed in initial and long-term patency between the 2 groups.

Whether the presence of EIA disease, regardless of severity, is a significant predictor of poor outcomes after angioplasty/stenting in women has been debated.^{7,11} Timaran observed significantly worse results in women among a group of 67 patients

Table 1. Incidence of Concomitant Procedures in Patients Undergoing External Iliac Artery Stenting

	Year Reported	No. of Patients (arteries)	Mean Follow-Up (months)	Associated Common Iliac Angioplasty/Stent	Associated Open Femoral Procedures	Associated Infrainguinal Bypass and/or Distal Endovascular Procedures
Pulli ^a	2011	223	18	N/A	26/223 (8.5%)	17/223 (7.6%)
Maurel	2009	90 (107)	23	20/90 (22%)	8/91 (12%)	2/91 (2%)
Nelson ^b	2002	34	13	4 (12%)	36 (100%)	14 (41%)
Timaran ^c	2001	67 (87)	28	45/87 (51%)	N/A	55/247 (22%)
Lee	2000	69 (98)	21	7/98 (7%)	N/A	N/A
Chang ^d	2008	171 (193)	24	104 (66%)	N/A	52 (27%)
Kashyap ^e	2008	83 (127)	21	N/A	12 (14.4%)	5 (4%)
Authors ^f	2011	36	20.9	11 (30.6%)	6 (16.6%)	20 (55%)

Abbreviations: EI, external iliac; CI, common iliac; FP, femoral-popliteal; N/A, not available.

^a Series included EI and CI lesions.

^b Series only included patients with EI stenting and combined common femoral endarterectomy.

^c Series reported additional concomitant procedures in entire cohort (common and external iliac stents).

^d Series only included patients with EI and CI stenting and combined common femoral endarterectomy.

^e Series compared aortofemoral reconstruction with angioplasty/stenting of both EI and CI arteries.

^f Two patients had both associated open procedures and FP/distal endovascular procedures.

with claudication or critical limb ischemia treated with EIA stenting with a primary patency rate of only 61% and 47% at 1 and 3 years compared with a global rate of 76% and 56% for the entire series.¹¹ Our numbers are too small to draw any conclusions on the influence of gender in our cohort.

Concomitant Procedures

Management of concomitant femoral artery and distal infrainguinal disease is an important consideration in patients with aortoiliac disease. In a recent report, 50% of patients required a local endarterectomy with or without a profundoplasty and another 11% needed simultaneous lower extremity bypass in patients undergoing an aortofemoral bypass.¹³ In the same series, comparing open to endovascular intervention, 21% of the angioplasty/stent group required either femoral reconstruction or a bypass. In our experience, 20 patients (55%) underwent associated infrainguinal bypass and/or distal endovascular procedures and 6 (16.6%) also had an endarterectomy or an interposition graft. In a similar series of patients with EIA stenting, 8 (12%) of 91 patients had associated open femoral or distal procedures performed.⁷ In a recent report of 223 interventions for aortoiliac disease, concomitant open surgical procedures were performed in 26 patients (8.5%).¹⁴ Eighteen underwent open femoral endarterectomy, 8 femoral-femoral, and 4 femoral-popliteal bypasses. In addition, an associated endovascular procedure involving the femoral/popliteal system was necessary in 17 patients.

One of the few reported experiences describing results with EI stenting combined with concomitant femoral endarterectomy was published by Nelson and colleagues.¹⁵ Four (12%) of the 34 patients in the series also needed CI angioplasty and 14 (41%) had distal revascularization performed. With a mean follow-up period of 13 months, 1-year primary patency and primary-assisted patency rates were 84% and 97%, respectively.

The overall experience in patients requiring EIA stenting is that a significant number will also require CIA stenting, local femoral reconstruction, or distal femoral endovascular or bypass procedures. It behooves the vascular surgeon to be prepared to do more than EIA stenting in this group of patients.

Influence of Concomitant Distal Disease

The influence of associated distal disease on the clinical outcome of iliac revascularization with either open surgical procedures or endovascular methods has been debated. Stein reported a clinical benefit of 23.3% at 4 years following aortofemoral surgical bypass in patients with outflow disease compared with 84% in patients with good outflow.¹⁶ Laborde et al studied 455 patients comparing patients with aortoiliac disease, external iliac disease, and multilevel disease to determine outcomes.¹⁷ The presence of associated distal disease was a powerful predictor of unsatisfactory outcomes following iliac stent placement. At 3 years, only 60.8% showed clinical success compared with 91.6% with aortoiliac/iliac disease and 97.9% with external iliac disease pattern. Ballard et al examined the treatment of TASC type D iliac lesions and found that ipsilateral superficial femoral artery occlusion was an independent predictor of both bypass graft failure and stent failure.¹⁸ Our experience with patients who require EIA/CIA stenting with concomitant distal revascularization confirms that primary patency dropped off after the first 10 months in contrast to the other 3 subgroups (Figure 4).

Conclusion

In summary, our results show good technical and short-term success with EIA stenting and concomitant CIA stenting and/or distal revascularization. The use of endovascular techniques for TASC C and D lesions is still debated. The vascular surgeon should be prepared to perform a local revascularization or

distal procedure to improve outflow at the time of EIA stenting in over two thirds of this population. In addition, almost one third of patients needing EIA stenting will need CIA stenting as well.

Acknowledgement

The authors appreciate the assistance of Carrie Houts MSc and Jean-Philippe Gouin MA with statistical analysis.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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